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MOVEMENTS OF EUROPEAN STARLINGS CAPTURED AT A WINTER ROOST IN OMAHA, NEBRASKA

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Abstract: European starlings (*Sturnus vulgaris*) were using downtown Omaha, Nebraska, as a winter roosting site. We used radio telemetry and leg streamers to track birds in this roost. Between late December 2005 and March 2006, we radio tagged 57 starlings and located them 432 times. We attached leg bands and colored leg streamers to over 1,300 starlings captured at trapping sites within 7 km (4 mi) of the downtown roost. These techniques yielded data on previously unknown sites where starlings gathered to forage, stage, and roost. The maximum distance that a marked bird was observed from the downtown roost was 35 km (22 mi). An effective starling management plan was implemented based on the movement and activity data we collected.

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Key words: invasive species, leg streamers, radio tagging, *Sturnus vulgaris*, urban roost, winter range.

The introduction of 50 pairs of European starlings (*Sturnus vulgaris*) in New York City's Central Park in 1890 and 1891 resulted in permanent establishment of this Old World species in North America (Cabe 1993). Sixteen pairs of European starlings (henceforth, starlings) survived the introductions of 1890 and 1891. From these original 32 colonists, the population expanded rapidly. Starlings reached the Mississippi River in 1928; by 1942, they reached the West Coast (Jewett 1942).

The North American starling population was estimated at 200 million, which is about one-third of the world population (Feare 1984). Between 1966–1976, starling numbers increased in many areas, especially the Southern Great Lakes region and the Southwest, where the population almost doubled (Dolbeer and Stehn 1979). Recent data from the North American Breeding Bird Survey (BBS) suggest that the population has stabilized. Starlings ranked second behind red-winged blackbirds (*Agelaius phoeniceus*) in total counts on U.S. BBS routes in 2005 and are among the most numerous of North American bird species (USGS-PWRC 2007).

During the winter of 2005–2006, a starling roost of 10,000-50,000 birds occupied downtown Omaha, Nebraska. The roost had been increasing in size for the last couple of years prior to our study. The birds roosted on window ledges, building facades, and fire escapes. Business owners near the roost were complaining about the

unaesthetic appearance of their properties and the added costs in cleaning starling waste from buildings, plazas, and landscapes. We captured starlings in downtown Omaha and nearby areas and used radio transmitters and leg streamers to monitor movement patterns and activities. Our goal was to find staging and foraging sites within the winter range of the downtown roost.

METHODS

From 20 December 2005 through 15 March 2006, we captured starlings with baited drop-in traps located at various sites within 7 km (4 mi) of downtown Omaha. We also hand-captured and netted starlings at the downtown roost by accessing window ledges from the inside of buildings. For birds selected for radio telemetry, we attached 2.0 g (0.04 oz) A2440 transmitters (Advanced Telemetry Systems, Inc. Isanti, MN). The transmitter was positioned on the dorsal surface of the bird's fused pelvic region, attached with a modified figure-8 harness that fit snugly into the proximal portions of the thighs and over the back (Rappole and Tipton 1991). The harness consisted of a nonirritating, ligature-like material. The radioed birds were banded with U.S. Fish and Wildlife Service aluminum bands, and released at the capture site.

Most of the radio tracking was done with 2 pick-up trucks mounted with dual 6-element yagi antennas attached to scanning receivers. On occasion we would aerially track with a fixed-wing aircraft mounted with 2 4-element yagi antennas. The GPS coordinates of transmitters acquired through aerial searches were relayed to ground tracking units for more precise locations. We used a hand-held 3-element foldable yagi antenna to recover downed transmitters and to make precise locations of living birds. Birds that were not radio tagged were leg banded and marked with a colored 10-cm (4-in) leg streamer and released at the site of capture. In December and early January, different colored streamers were used to identify birds by their capture site. After this period, streamers were still used but capture sites were no longer differentiated by color.

RESULTS AND DISCUSSION

Thirty-nine of 57 radio-tagged birds were captured at the downtown roost. The remaining birds were captured in drop-in traps. We made 432 telemetry locations on 53 birds. There were multiple sites within 5 km (3 mi) of the downtown roost that received heavy use, both in the mornings and late afternoons. These sites included food processing plants, grain depositories, industrial parks, feedlots, water treatment facilities, and power plants. The latter 2 sites were located near open water lakes. Lake shorelines may hold high concentrations of invertebrates, a favorite food of starlings. Lawns and alleyways of treed residential areas also received heavy use, but the birds were not congregated at these sites.

The radio-tagged birds were scattered widely by late morning. Several were found during midday in Council Bluffs, Iowa. Rural areas and small towns near Omaha were also visited frequently. By late afternoon the birds would generally begin returning to Omaha and gathering at staging sites within a few miles of the roost. However; day-to-day use of the Omaha roost by radio-tagged birds was inconsistent, with several of the birds missing for periods lasting a week or longer. These birds may have been staying in Omaha undetected or were intermittently using satellite roosts in the outlying areas. Our study occurred during a warm winter with open ground, which can increase the breadth of the winter range and change the roosting behavior of starlings (Maccarone 1987).

Three of the radio-tagged birds were very consistent and localized in their movements and were never located more than a few kilometers from their capture sites. The average number of radio locations for these 3 birds was 34. By comparison, the average number of locations for all birds was 8 (SD = 8.2). Small-sized home ranges during winter may be the result of a lingering fidelity shown by resident starlings toward their nesting territories (Morrison and Caccamise 1985).

We banded and attached leg streamers to 1,350 starlings. Leg streamers were observed at the downtown roost and at staging and foraging sites. Observations of several different streamer colors within single flocks indicated an intermixing of birds captured at the downtown roost and the other trapping sites surrounding the roost. Streamer-marked and radio-tagged birds were both located ≥16 km (10 mi) from downtown Omaha (Fig. 1).

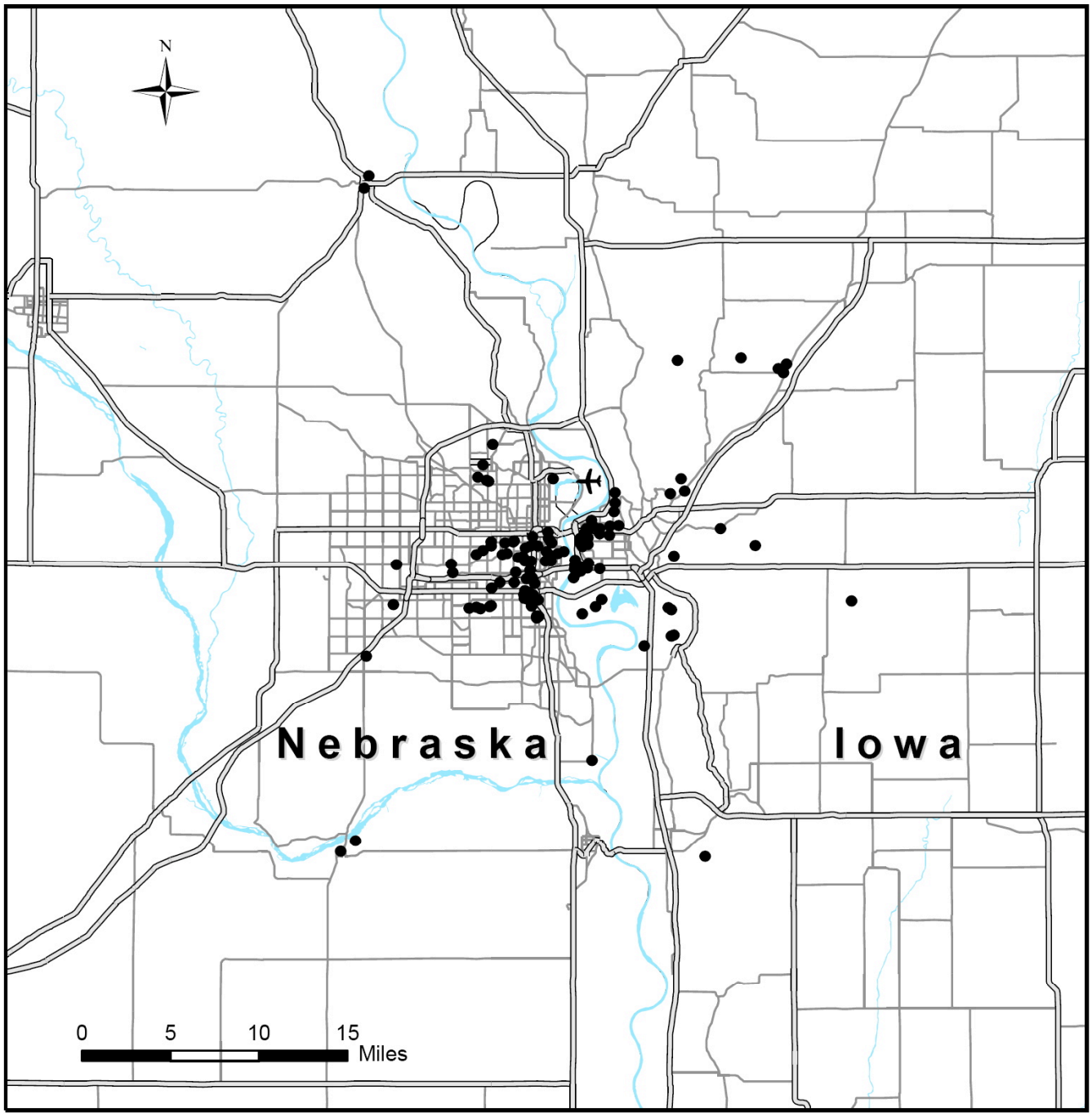

Fig. 1. Locations of radio-tagged and color-marked European starlings captured in Omaha, Nebraska, during the 2005-2006 winter.

The number of locations recorded at distances >16 km from the downtown roost (n = 15) was nearly equal between streamers and radio tags. Two streamer-marked birds were observed at a large starling roost near Blair, Nebraska, 35 km (22 mi) northwest of downtown Omaha. This was the maximum recorded distance from the downtown roost. The exchange of individuals among roosts spaced over broad areas has been documented previously in starlings (Morrison and Caccamise 1985).

A 35-km radius of travel generates a winter range of 3,800 km^2 (1,450 mi^2). To a strong flying bird, such as the starling, a 35-km distance is of little consequence (Caccamise and Morrison 1986, Caccamise and Morrison 1988). The numerous locations in Fig. 1 indicated heavy diurnal use inside the city limits of Omaha (and to a lesser degree, Council Bluffs). However, the cluster of locations around Omaha was from the fact that the majority of telemetry locations were made during the downtown roost's morning departures and

evening returns. The chances for making an observation decline significantly as a tagged bird travels farther from a concentration point because of the nonlinear area-to-radius relationship. The number of locations we made at ≥ 10 km from the roosting site probably indicated that the wintering population was accessing and using large blocks of area within the 3,800 km^2 range, particularly the rural areas of western Iowa east of Council Bluffs.

We believe that the combination of radio telemetry and leg streamers provided us with a rapid and reasonably accurate assessment of movements and activities of the Omaha starling roost in the winter of 2005–2006. These tracking techniques yielded information on previously unknown sites where starlings gathered to forage, stage, and roost. Prior to conducting this study the consensus was that birds from the downtown roost remained mostly within the city limits of Omaha and Council Bluffs. The data we gathered indicated a wider range of activity, and helped in the design of an effective starling management program implemented in the 2005–2006 winter.

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